LECTURE 17

Effect on Swell Shrink aspect

The effect of compaction is to reduce the void space. Hence the swelling and shrinkage are enormously reduced. Further, soil compacted dry of optimum exhibits greater swell and swell pressure than that compacted on wet side because of random orientation and deficiency in water.

Standard Proctor's Compaction Test

Refer IS 2720 – Part VII – 1987

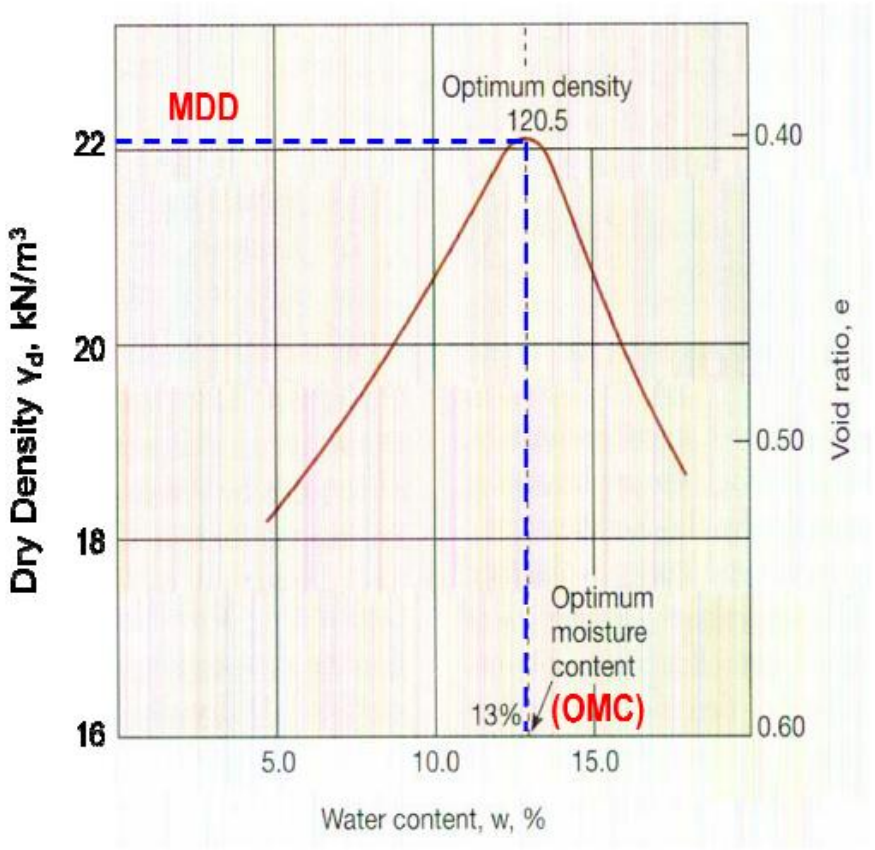
Apparatus

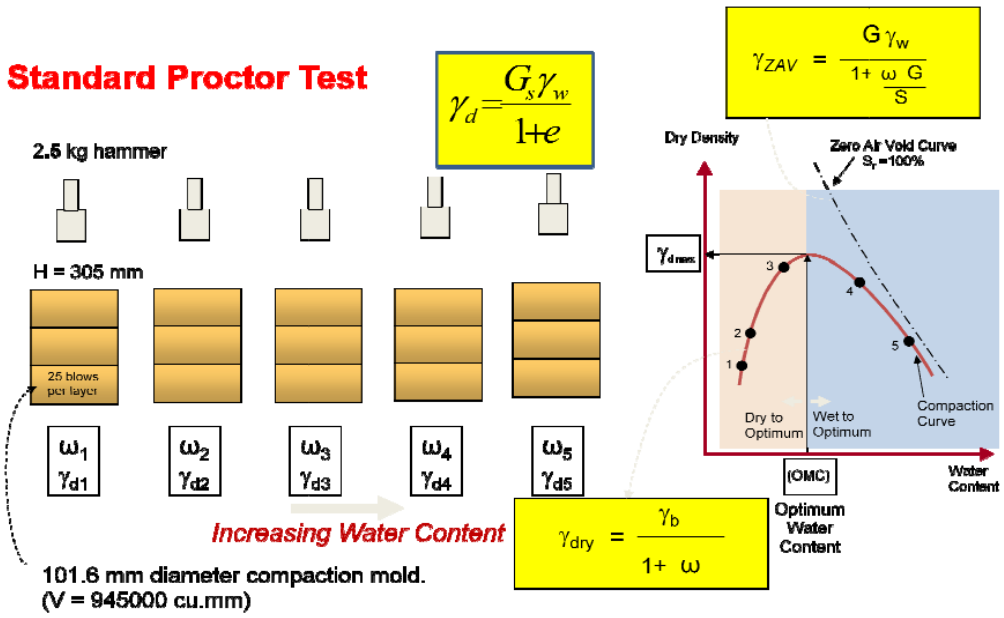
1. Cylindrical metal mould with detachable base plate (having internal diameter 101.6 mm, internal height 116.8 mm and internal volume 945000 mm^3)
2. Collar of 50 mm effective height
3. Rammer of weight 2.5 kgf (25 N) with a height of fall of 304.8 mm

Procedure

1. About 3 kg of dry soil, with all lumps pulverized and passing through 4.75 mm sieve is taken.
2. The quantity of water to be added in the first trial is decided. (Less for Corse grained soil and more for Fine grained soil).
3. Mould without base plate & collar is weighed
4. The inner surfaces of mould, base plate and collar are greased.
5. Water and soil are thoroughly mixed.
6. Soil is placed in mould and compacted in three uniform layers, with 25 blows in each layer. Blows are maintained uniform and vertical and height of drop is controlled.

7. After each layer, top surface is scratched to maintain integrity between layers.
8. The height of top layer is so controlled that after compaction, soil slightly protrudes in to collar.
9. Excess soil is scrapped.
10. Mould and soil are weighed (W)
11. A representative sample from the middle is kept for the determination of water content.
12. The procedure is repeated with increasing water content.
13. The number of trials shall be at least 6 with a few after the decreasing trend of bulk density.





Modified Compaction Test

In early days, compaction achieved in field was relatively less. With improvement in knowledge and technology, higher compaction became a necessity in field. Hence Modified Compaction Test became relevant. It was developed during World War II by the U.S. Army Corps of Engineering tobetter represent the compaction required for airfield to support heavy aircraft.

6.4 Distinction between Standard & Modified Compaction

Standard Proctor Test	Modified Proctor Test
305 mm height of drop	450 mm height of drop
25 N hammer	45 N hammer
25 blows/layer	25 blows/layer
3 layers	5 layers
Mould size: 945 ml	Mould size: 945 ml
Energy 605160 N-mm per m^3	Energy 2726000 N-mm per m^3

Compactive energy

$$\frac{\text{No. of blows per layer} \times \text{Number of layers} \times \text{Weight of hammer} \times \text{Height of drop of hammer}}{\text{Volume of mould}}$$